

SOME RECENT ASTRONOMICAL WORKS.¹

THE appearance of another star catalogue from the Radcliffe Observatory shows how loyal that institution has remained to the traditions that Main and Stone received from Johnson and the earlier observers. The result is in every way worthy of those traditions. Other duties may have divided the attention of the director. The maintenance of the observatory in the first rank has demanded within the last few years that new and larger instruments should be erected, and the adjustment of these has necessarily taxed the energies of the small staff at the observers' disposal. But these imperative tasks have only had the effect of diminishing somewhat the number of stars observed. The accuracy and the independence of the observations, which have ever been a feature in the Radcliffe meridian measures, have in no whit suffered. In these respects the tradition of the observatory has been unflinchingly upheld.

The introduction to the volume shows that the stability of the instrument has been increased by structural alterations. The examination of the division errors, that tedious and laborious work, involving in this case more than ten thousand readings of the circle, has been manfully tackled with apparently greater care than Stone bestowed upon this fundamental work. The pivots have been tested by an apparatus that Dr. Rambaut himself has perfected. The results are apparently quite satisfactory. Finally, we are brought face to face with that troublesome R-D correction, the origin of which defies satisfactory explanation, as its treatment taxes ingenious applications. The method employed at Oxford is not the same as that which recommends itself to the authorities at Greenwich. At the former observatory no correction for this discordance has been made to the direct measures, the whole difference being applied as a correction to the reflexion observations in order to render the two series homogeneous. In the Greenwich observations of zenith distance, a correction is applied which has practically the effect of making the final result a mean between the direct and reflected observations. One may not say that it is a consequence of these different methods of reduction that the declinations obtained at Oxford and Greenwich show systematic differences. But when a comparison between the star-places common to the two catalogues (Radcliffe, 1900, and Greenwich, 1890) is instituted, a systematic discordance is disclosed, the greater portion of which can be removed by reducing the Greenwich and Radcliffe observations in substantially the same manner. The zone catalogue of Albany also includes a large number of stars that have been observed at Oxford. A comparison between these two catalogues is most satisfactory. The difference between the two is practically the same as between Albany and Romberg's Pulkova catalogue. Of the accuracy of this latter Prof. Auwers has spoken in the highest terms. We may offer our congratulations to Dr. Rambaut on the successful completion of a heavy piece of work, and express the hope that the large equatorial, the mounting of which has interfered so much with the progress of his meridian measures, will amply fulfil its early promise.

The parcel from Groningen contains specimens of those laborious calculations to which the astronomers of that University are so much attached, and by which other astronomers have profited. Prof. Kapteyn here gives the results of his discussions of the proper motions of the greater part of the Bradley-Auwers stars on different assumptions of the value of the precessional constant, the position of the solar apex, and of systematic correc-

tions to the proper motions in declination. Of the 3222 stars contained in Auwers-Bradley, 2640 have been discussed. Satisfactory reasons are given for omitting the remainder, so that the material may be considered exhausted. The results, grouped according to the galactic latitude of the stars or the type of spectrum, have been made the groundwork of special investigations. Since these have been before the astronomical world some time, it is not necessary to enter into any lengthy description here. The tables indicate a great amount of care and industry, and will be useful to those who wish to make independent investigations based on the proper motions of the stars.

Dr. Sitter's contribution contains new and useful matter. The tables here arranged show at a glance the times of the year most suitable for making stellar parallax observations, on the assumption that the method of photography will be adopted and that the plates will be taken near the meridian. Some tables are also given that will be of use in the subsequent reduction of the measures. Profs. J. C. and W. Kapteyn add a collection of differential formulæ connected with the solution of spherical triangles. The authors believe that such formulæ would be of more general use if the amount of the neglected terms was known with certainty. To remove this difficulty, the formulæ here given are correct to the squares of the differences. Convenience rather than originality seems to have influenced the authors, both here and in other formulæ applicable to plane and spherical triangles in which certain of the elements are small. Another table for which we have not yet found any extended use is one giving the trigonometrical functions for each degree in the circle to two places of decimals. But the authors say that mathematically trained persons have found it so useful in relieving their mind from mental strain, that they contemplate publishing a similar table giving the natural trigonometrical functions to three places of decimals for every tenth of a degree throughout the entire circle.

Such tables might possibly be of service to the readers of the next work on our list, "*Cours d'Astronomie*," by M. Louis Maillard, though, as the author does not vouchsafe any word of preface, it is uncertain for what class of students his book is intended. The purpose of the book is the more difficult to comprehend since we have but one volume of the work from which to judge of its aim and extent. But the writer of a text-book on astronomy has to keep within lines which are very well recognised. Especially is this the case when dealing with spherical astronomy. The facts do not materially change or increase. The only choice the writer can exercise is to decide between a work of reference which shall be as encyclopædic as possible, or a text-book which shall present to the reader a manageable amount of matter from which he may acquire an adequate grasp of the facts and principles upon which the science is supported. M. Maillard apparently prefers the text-book, and proceeds on the usual unheroic lines. He begins with the derivation of the ordinary formulæ of spherical trigonometry, to which he adds a few pages giving some elementary notions on the theory of least squares. But these few pages serve no useful purpose, and might have been omitted with advantage. When it is added that the author has some chapters on problems connected with diurnal motion, and a description of the constellations, it will be understood that he is catering for a class that is not very far advanced in astronomical study. But the chapters on parallax and aberration are generally full enough for all who have not to make any practical application of the theory. Finally, the section on the earth and geodetic measurement is made quite interesting. The book ought to have a ready appreciation among students in high schools and colleges, and is an advance on some of those which have long done duty in this country, and still enjoy an honoured position. The book is apparently lithographed, but it is very handsomely finished, and the diagrams are new and well reproduced.

Of a very different calibre and purpose is Mr. Stirling's work. M. Maillard has been developed in an atmosphere of extreme orthodoxy. He is not, and has no wish to be thought, original. His methods have received the sanction of many generations of teachers. For good or for evil,

¹ "Catalogue of 1772 Stars chiefly comprised within the Zone 85°-90° N.P.D. for the Epoch 1000, deduced from Observations made at the Radcliffe Observatory, Oxford, during the years 1894-1903, under the direction of Prof. Arthur A. Rambaut, F.R.S. Pp. xxxvi+81. (Oxford: Henry Frowde, 1906.)

"Publications of the Astronomical Laboratory at Groningen." Edited by Prof. J. C. Kapteyn. Components of the Proper Motions and other quantities for the Stars of Bradley. Tables for Photographic Parallax-Observations by Dr. W. de Sitter. Some useful trigonometrical formulæ and a table of gonimetric functions for the four quadrants, by Prof. J. C. Kapteyn and Prof. W. Kapteyn. (Groningen: Hoitsemma Bros., 1906.)

"Cours d'Astronomie," par Louis Maillard. Tome I. Pp. 243. (Paris: Librairie scientifique, A. Hermann, no date.) Price 7.50 francs.

"New Theories in Astronomy." By William Stirling. Pp. xv+336. (London: E. and F. N. Spon, Ltd., 1906.) Price 8s. 6d. net.

these methods have become stereotyped. But the late Mr. Stirling, as an engineer, had to think for himself, and, moreover, his occupation removed him to places far from the busy crowd. He could scarcely have had the opportunity of examining and testing his opinions by comparison with those of others who have been differently trained, for he passed much of his life in furthering railway enterprise in Chili and Peru. There he was free to follow the lines of thought that his uncurbed fancies suggested. His book is therefore marked with much freshness, but also with some errors. In many respects it is interesting, since it shows the confusion which an intelligent mind may create for itself when it disregards the trammels of authority and attacks problems for the study of which it is not fitted by previous training.

We get the first insight into this mutinous disregard for authority when we find our author describing, in his first chapter, the experiments which the late Sir George Airy carried out at the Harton Colliery. It cannot be denied but that these experiments are open to some objection, though possibly not entirely on the grounds on which the author insists. But there is a certain refreshing keenness in his criticism which one can read and enjoy. We next find our author hopelessly blundering over that terrible question of the moon's rotation, and we cannot help thinking that the late Mr. Stirling must have had in his nature a considerable spice of obstinacy. He was far too intelligent not to have recognised the true character of the problem and to have found its solution. It is to be regretted, perhaps, that he did not rely upon his own good sense, and that he consulted so many authorities. He has our sympathy to the extent that these authorities have not always expressed themselves with clearness, and in some cases not even with accuracy. But with perverted ingenuity he seems to have fastened upon any looseness of expression he could find, and has endeavoured to give it a construction that it will not legitimately bear. But when we find the centrifugal force due to the moon's rotation introduced as a cause to explain the transference of air and water from the visible hemisphere of the moon to the hemisphere that we do not see, we are disposed to give up our author as incorrigible. It is not at all surprising after this that he should turn his attention to the nebular hypothesis, that he should find its explanation inadequate, and to need some finishing touches which he is ready to supply. For this is a subject that attracts those most keenly who are least qualified to handle it intelligently. Unfettered by close reasoning and unfamiliar with the bearing of material facts and deductions, they lose themselves in apparently plausible intricacies, and hopelessly puzzle those who attempt to follow them.

W. E. P.

UNIVERSITY AND EDUCATIONAL INTELLIGENCE.

CAMBRIDGE.—Dr. H. W. Marett Tims, of King's College, demonstrator of anatomy in the University, has been appointed professor of biology at the Royal Veterinary College, London.

At a meeting of the president and fellows of Queens', held on Wednesday, July 18, Prof. H. T. Bovey, F.R.S., professor of engineering in the University of Montreal, was elected an honorary fellow. Mr. Bovey was formerly a fellow of the society.

The master and fellows of Christ's College have elected Mr. Francis Darwin, foreign secretary to the Royal Society, honorary fellow. Mr. Darwin for many years held the readership of botany in the University and a fellowship at Christ's. Dr. G. H. F. Nuttall, F.R.S., has been elected a fellow of the same college. Dr. Nuttall has held teaching posts at the Johns Hopkins University, Baltimore, and at the University of Berlin. He is at present reader in hygiene at Cambridge and chief editor of the *Journal of Hygiene*, which he largely helped to found.

DR. G. C. BOURNE has been appointed Linacre professor of comparative anatomy at Oxford, in succession to the late Prof. Weldon.

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A CLASS in experimental psychology, including practical work and demonstrations, will be held by Prof. C. S. Myers on Saturdays in the psychological laboratory of King's College, London, beginning on October 6.

MR. V. H. BLACKMAN has been appointed lecturer in plant cytology in the department of botany of University College, London. In view of the new relationship between the college and the University of London, and in order to avoid confusion with the principal of the University of London, the title of the Principal of University College will be changed to that of Provost of University College.

MR. CLARENCE H. MACKAY and Mrs. John W. Mackay have given 20,000*l.* to the University of California, to endow the chair of electrical engineering. It will be known, says *Science*, as the John W. Mackay, jun., professorship, in memory of Mr. Mackay's brother, and will be filled by Prof. C. L. Cory, head of the department of mechanical and electrical engineering.

THE Board of Education has issued its instructions for the year August 1, 1906, to July 31, 1907, to technical schools, schools of art, and other day and evening schools and classes for further education. As is becoming common in the Board's publications, the volume begins with a prefatory memorandum, and in it great stress is laid upon the value to the student of science and technology of what is commonly called "general" education. Steps are detailed by which the Board proposes to encourage this side of the work of these schools and classes. It is pointed out that the lower classes of a good evening school afford to pupils, who have just left an elementary school, both a continuation of their general training and instruction in the application of that training to matters that come before them in their daily work. It is where, says the memorandum, this double aspect of evening schools is best developed, and where the lower and higher classes are most fully knit together, that the best records of attendance and of real progress are to be found. A distinct advance is recorded, we are glad to find, in the preliminary education of students entering higher classes in day technical schools, and this is to be traced to more efficient evening continuation schools. These regulations also make provision for an inclusive grant to local education authorities, other than London, in place of the separate grants assessed by taking into consideration the number of hours of instruction received by registered students in approved subjects. An authority wishing to receive such an inclusive grant must submit to the Board particulars of the manner in which it is proposed to make provision for the educational needs of the area and for the coordination of the several types and grades of this instruction with the other forms of education available for the area. All such endeavours to prevent overlapping and duplication of educational facilities, and to bring about economy and efficiency, are welcome. It is to be hoped the new plan proposed by the Board will effect the object in view.

SOCIETIES AND ACADEMIES.

LONDON.

Royal Society, June 21.—"The Transition from the Liquid to the Solid State and the Foam-structure of Matter." By Prof. G. Quincke, For.Mem.R.S.

On June 19, 1905, the author laid before the Royal Society the results of his researches on ice-formation and glacier-grains (see *NATURE*, September 28, 1905, vol. lxxii., p. 543). The further prosecution of these researches has shown that phenomena similar to those observed in the freezing of water occur in all bodies in nature, and are in agreement with the structure of metals as observed by the author and also by other investigators. Solid bodies, then, are never homogeneous, but always exhibit a foam-structure.

All liquids in nature resemble water in forming, as they cool, oily foam walls, which may be very thin and invisible. The shape and position of these foam walls become visible on freezing or thawing in the following ways:—(a) By fissures or fractures at the surface of the foam walls,